The Committee on Radio Frequencies ("CORF") filed comments proposing several changes to the provisions of § 25.213(a), some of which constitute valuable clarifications of this section, while others seek to impose unacceptable burdens on MSS operations outside the band allocated to radio astronomy.[85] Constellation disagrees with CORF's interpretation of RR733E[86] as affording it any special protection from out-of-band emissions. Constellation pointed out in its Comments that the protection level desired by the radio astronomy community is defined unilaterally by that community and is not a level of protection that is afforded as a general Commission rule.[87] While a practical protection zone concept based on the desires of the radio astronomy community was agreed upon for co-channel operations within the 1610.6-1613.8 MHz during the NRM, such agreement was not reached with respect to providing the same level of protection from out-of-band emissions because of the operational impact on MSS. As discussed above, the Commission's L-band assignment plan relegates CDMA systems to the less desirable portion of the 1610-1626.5 MHz band. CORF's proposal to expand the impaired portion of the band by another 2 MHz is unacceptable.

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[85] Cornell University also filed comments requesting application of out-of-band emission limits on MSS operations.

[86] RR 733E predates the 1992 WARC when the 1610.6-1613.8 MHz band was allocated to radioastronomy on a secondary basis. Since radio astronomy was elevated to primary status at the 1992 WARC, RR 733E no longer serves a useful purpose and should be deleted at the next WRC.

[87] ITU RR 344 provides that "... protection from services in other bands shall be afforded the radio astronomy service only to the extent that such services are afforded protection from each other."

Constellation does not agree with CORF's proposal that the Electromagnetic Spectrum Management Unit ("ESMU") of the National Science Foundation, Washington, D.C., simply "maintain a current schedule" of radio astronomy observations. Contrary to CORF's fears, five MSS space station licensees is not a "large" number of parties to be notified. Constellation believes the current wording of § 25.213(a)(1)(v) is an unambiguous definition of the ESMU's obligations in implementing the protection zone concept, and intends to cooperate with ESMU in developing the most efficient means of making this concept work in practice.[88]

B. Glonass

The viability of the Commission's proposed L-Band assignment plan is directly linked to the shifting of all Glonass operating frequencies below 1606 MHz and the incorporation of appropriate filters in Glonass receivers to reduce their sensitivity to MSS transmissions on frequencies above 1610 MHz. This is the only workable solution as long as the aviation community continues to advocate protection requirements and interference scenarios that preclude MSS operations in the 1610-1616 MHz band. This solution will require coordination between the United States and Russian administrations. As a result, the second and third sentences of the proposed § 25.213(c)(1) should be deleted. The second sentence in this proposed rule simply states the obvious requirement that coordination be

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[88] Constellation does not preclude ESMU and the LEO MSS space station licensees from reaching an agreement in the future that ESMU's maintenance of a single information source in a mutually agreed upon format constitutes "notification" for the purposes of § 25.213(a)(1)(v).

undertaken. The third sentence creates confusion with respect to the co-primary status of MSS in the 1610-1626.5 MHz band, and puts the Commission in a tactically weaker position in negotiating a coordination agreement since it appears to place all the burden of resolving interference problems on the MSS. The only portion of § 25.213(c)(1) that should be retained in the MSS service rule is the quantified EIRP density sharing criteria specified in the first sentence of this proposed rule provision.[89]

Resolution of the Glonass issue will require the full support of the United States government and the cooperation of the aviation and MSS communities. In Constellation's view, the aviation community[90] has taken the position of insisting on protecting every Glonass signal under worst case conditions that impose far more stringent interference criteria on MSS transmissions than are required to assure that the functioning of the radionavigation service is not endangered.[91] Each Glonass signal is operated as part of a large ensemble of Glonass and Global Positioning System ("GPS") signals that will comprise the Global Navigation

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[89] Constellation disagrees with the Comments of Aeronautical Radio, Inc. and the Air Transport Association of America ("Arinc/ATA") (See Comments of Arinc/ATA at 2-3) that the -15 dB (W/4 KHz) EIRP density limit applies only after Glonass moves below 1610 MHz. A clear reading of RR 731E indicates that it is the -3 dB(W/4 KHz) value that is applicable after Glonass moves below 1610 MHz and that the -15 dB(W/4 KHz) value is applicable as long as Glonass operates between 1610 and 1616 MHz. Similarly, Arinc cites the NRM Final Report to support several of its interference claims, but fails to note that these were the view of only the aeronautical community, and not the view of the NRM committee as a whole.

[90] See e.g. Comments of Arinc/ATA, Federal Aviation Administration, and Rockwell International Corporation.

[91] See RR 163 definition of harmful interference.

Satellite System. The interference scenarios used by the aviation community to develop interference criteria should focus on insuring accurate radionavigation from GNSS during flight on an overall system basis. Development of realistic interference criteria will require more sophisticated models than the 100 foot separation, worst case antenna geometry posited in the materials submitted to the NRM committee. Given the extensive amount of technical work to be done by the aviation and MSS communities in this regard, Constellation urges the Commission to avoid imposing unachievable requirements in § 25.213 of the rule.[92]

C. Other Interservice Sharing Issues

Except for the deletion of the proposed § 25.213(d)[93], Constellation did not address other inter-service sharing situations in the 1610-1626.5 MHz and 2483.5-2500 MHz bands because it did not believe there are any insurmountable problems that could not be solved under current coordination procedures and international sharing criteria.[94] No evidence to the contrary has been presented in the initial comments of the other parties responding to the Commission's Notice.

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[92] Constellation reiterates its position that § 25.143(b)(2)(iv) contemplates a demonstration of compliance with § 25.213 as a basic technical qualification, and that only the specific quantitative requirements of the first sentence of § 25.213(c)(1) can be demonstrated by an MSS applicant.

[93] See, Comments of Constellation at 53.

[94] The extensive technical appendices to LQP's May 5, 1994 Comments provide additional evidence for this conclusion.

VI. There Is No Need For Any Additional Rules Beyond Certain Minor Modifications To The Proposed Service Rules For The 1.6/2.4 GHz MSS Service

In its comments Constellation was in general support of the service rules proposed in the NPRM. Many of the commenters proposed minor adjustments to these rules to insure that they worked effectively in practice. As outlined below Constellation supports many of these adjustments in order to improve the efficiency of the regulations and eliminate any ambiguities as to the responsibilities of the licensee.

A. License Term

There was a universal support for a ten year license term for 1.6/2.4 GHz MSS systems with an explicit renewal expectancy. However, there was considerable discussion in the comments as to how a license renewal would work in practice. Two specific issues were raised in this context. The first issue related to the introduction of replacement satellites during a ten year license term. Constellation and all the other eligible applicants indicated that it would be necessary to replace all satellites at least once during this ten year period. There was concern expressed that the replacement process should not be overly burdensome and allow sufficient flexibility for technical evolution of the satellites. LQP states that "[f]rom a technical standpoint it makes no sense to replace the first generation satellites with 'technically-identical' satellites. Moreover, when the second-generation system is being built, LQP would incorporate technical upgrades to improve service. The

Commission's proposal would, in fact, discourage improvements in satellite capabilities contrary to the public interest".[95] Constellation proposed that a licensee be allowed to replace existing satellites within the ten year license term with new satellites "with the same particulars of operation.[96] This approach would provide the licensee the ability to upgrade satellite designs as long as any technical changes do not change the interference environment. This is no reason to require a licensee to become engaged in a burdensome regulatory process if its replacement satellite does not cause increased interference. Moreover, the ongoing coordination process between 1.6/2.4 GHz LEO MSS operators can allow mutually agreed upon changes in the interference environment as changing circumstances require. In any event, the Commission should allow system operators to change the technical characteristics of the satellites in their systems without opening the door to competing applications.

The second issue relates to the actual renewal of the blanket system licenses. Constellation indicated in its comments that, while an individual renewal time schedule for each licensee was certainly a desirable goal, it may be unworkable. Specifically, if at the time of renewal or any time preceding that time a licensee may propose to make major changes in system design that could adversely affect future

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[95] See Comments of LQP at 114.

[96] See Comments of Constellation at 62.

renewal applications. Under such a situation, the Commission must issue a cut-off order and consider the requirements of all licensees at the same time. This is the only way where the rights of each individual licensee can be protected.

B. Spare Satellites

The Commission proposed to grant authority to launch a specified number of in-orbit spare satellites which "would remain inactive until needed."[97] LQP in its comments recommended that licensees be provided the authority to operate these spare satellites.[98] Constellation agrees. Spare satellites will provide 1.6/2.4 GHz MSS systems with additional operational flexibility by providing an additional means for providing path diversity. Constellation supports modification of the proposed Section 24.143(d) as proposed by LQP.

C. Milestones

There was general support in the Comments for the milestone proposal contained in the Notice. All the applicants agreed that it was important to have milestones so that no licensee is able to warehouse the valuable spectrum resource. Several commenters made additional proposals on milestones. In particular, Motorola urged the Commission to restrictively define the types of actions that qualify as the beginning of construction. It did not however provide any detail on

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[97] See Notice at para 82.

[98] See Comments of LQP at 104.

what might be commencement of construction. Constellation believes that before the Commission institute any changes to its proposed rules that it be cognizant that an applicant who is a satellite manufacturer may be a better position to manipulate the milestone process than an applicant who is not a manufacturer.

Motorola also asks the Commission to establish an additional milestone for the ground segment infrastructure. Specifically, it wants a milestone requiring a licensee to "establish or arrange for the establishment and operation of the ground segment infrastructure in countries representing at least 75% of the world's population and surface area within six years of the grant of the space segment license."[99] This proposal is unacceptable. It is a self-serving attempt to disadvantage the other licensees since Motorola is the only applicant with a satellite design using intersatellite links that is immediately capable of providing the ground coverage standard it proposes. Such a requirement penalizes other LEO system architectures which do not bypass national PSTNs but require country-by-country agreements to implement their ground infrastructure.

Finally, Constellation supports several of the proposals on milestones made by TRW. Constellation does believe that the Commission should entertain reasonable requests for extensions of milestone deadlines once a system's license

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[99] See Comments of Motorola at 69.

term has commenced.[100] Once space stations have been launched, a license will have made a substantial financial commitment to its system. The Commission should be extremely reticent to take away a license once this commitment is made. Therefore, Constellation believes that the Commission should entertain reasonable requests for milestone extensions after part of its system has been placed in orbit.

Constellation also supports TRW's proposal "that permittees and licensees who miss implementation milestones . . . should be ordered by the Commission to show cause why their authorizations should not be summarily revoked, with the rules specifying that the Commission's decision will be made an accelerated time frame for staff action and any administrative appeals."[101] It has been at least three years since the 1.6/2.4 GHz MSS applications were filed with the Commission. Each of the applicants has expended a considerable amount of resources merely to participate in this proceeding not to mention the enormous resources to design and implement their systems. There can be no doubt that the resources spent in the coming years will grow exponentially. Given the commitment already made, it would be inherently unfair to allow any license to be automatically declared null and void without the ability for a reasonable Commission decision after a comprehensive review of the facts surrounding the particular situation. Given the

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[100] See Comments of TRW at 175.

[101] Id. at 178

equities involved, it is necessary for the Commission to issue a show cause order under such circumstances.

D. Gateway and Transceiver Licensing

Constellation in its comments proposed that the Commission conform proposed Rules 25.203(j) and (k) to the recommendations made in the NRM. Specifically, Section 25.203(j) should conform to the recommendation of § 5.1.3(e) of the NRM Report since the information is only relevant to space stations operating Ka-band feeder links with steerable narrow beam antennas. Likewise, Section 25.203(k) should be conformed to the recommendation of § 5.1.3(f) of the NRM Report because it is confusing to include a space station requirement in a rule section that deals with earth stations and because this requirement is already covered by proposed Section 25.278. It should be noted that there was general agreement among all the applicants on these proposals. With respect to blanket licensing for transceivers, there were few proposals for changes to the Commission's proposed rules.[102]

VII. The Commission's Proposed Treatment Of Safety Issues Is Sufficient And No Additional Requirements Should Be Adopted At this Time

The Commission's proposed rules[103] identify potential obligations of 1.6/2.4 GHz MSS systems regarding distress and safety communications. The

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[102] But see Constellation's proposals presented in Appendix A to its May 5, 1994 Comments.

[103] See proposed § 25.143(f) and Notice of paragraph 86.

Commission's discussion in the Notice indicates that the Commission does "not propose to require that MSS Above 1 GHz systems provide search and rescue or disaster response communications as a general service offering."[104] Constellation did not comment on this specific rule proposal because it does not currently plan to position its system as providing distress or safety communications or satisfying mandatory equipment carriage requirements.

Constellation is concerned that several parties have suggested that 1.6/2.4 GHz MSS systems be required to "consider [National Security and Emergency Preparedness] NS/EP requirements and cooperate in meeting them"[105] or to provide calling party location information to 911 systems in a standard format.[106] Detailed consideration of these issues is premature at this early stage of development of LEO MSS. As global systems, NS/EP and 911 service standards in the United States are unlikely to be directly applicable in other countries and Commission consideration of such issues in the context of national Personal Communications Service licenses is not likely to be relevant to the conditions under which the 1.6/2.4 GHz MSS will

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[104] Id. The Commission also notes in this section its proposal in paragraph 51 to require position determination capabilities in mobile earth stations in order to implement the protection zone concept to protect radio astronomy sites. However, as discussed above, Constellation does not believe that a position determination requirement should be applicable to all 1.6/2.4 GHz MSS terminals as a general rule. Otherwise, the Commission should have granted the pending LEO applications under the present RDSS rules.

[105] See Comments of the Manager of the National Communications System.

[106] See Comments of U.S. Coast Guard, Comments of Texas Advisory Commission on State Emergency Communication, and Comments of Bernard J. Trudell.

operate.

Constellation is certain that occasions will arise when its system will be used for distress and safety communications messages because of the wide area coverage capabilities of the Constellation LEO MSS system. However, such usage will be made on a case-by-case basis as determined by the particular circumstances of each call. Constellation will of course, be reviewing the development and operation of its LEO MSS system to enhance its capabilities for serving all of its customers needs, whether for personal, business or emergency communications. However, the Commission should refrain from imposing any additional obligations on the 1.6/2.4 GHz MSS service with respect to distress and safety communications beyond those specified in § 25.143(f) of the proposal rules.

VIII. Feeder Links Remain An Issue

Feeder link design can not be separated from the other elements of satellite system architecture. Thus, even if the difficult issues in the 1.6 GHz and 2.4 GHz service link bands are resolved, the Commission can not issue LEO system authorizations until the feeder link issues are also resolved. It is impractical for a licensee to begin satellite construction without knowledge of the feeder link bands to be employed on the satellite. The feeder link transponder frequency plan, power amplifiers, and antenna are inherent elements of the spacecraft design that can not be designed in isolation of the other spacecraft subsystems.

In its Comments, Constellation provided information on its feeder link requirements and the difficulties it would have if it had to operate its feeder links at Ka-band[107]. In particular, Constellation described the differences between the wide area, multiple gateway access concept of the C-band feeder link applicants and the steerable, spot beam concept of the Ka-band feeder link applicants. A number of significant feeder link issues have been raised in the Comments of various parties which must be resolved promptly by the Commission.

The following issues must be resolved: (i) how much feeder link spectrum is required? (ii) can feeder link bands be shared with GSO and with other non-GSO systems? (iii) what are coordination procedures for CDMA systems sharing the same feeder link bands? and (iv) what is the U.S. going to propose to the 1995 WRC? It is imperative that the Commission decide on feeder link bands (and regulatory scheme) prior to the time construction permits are issued. Concomitantly, the Commission must be prepared to seek international recognition of its feeder link approach at the 1995 World Radio Conference. This is necessary because all LEO applicants must be treated fairly with regard to feeder links. TRW and Motorola can not be given an advantage in the Ka-band while the other applicants must wait to see if alternative solutions materialize. If the other three applicants are forced into Ka-band at a later date because lower frequency bands are not available, they will be put to a tremendous disadvantage unless the necessary spectrum is reserved

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[107] See Comments of Constellation at 53-59 and Appendix C.

for their potential use.

A. Feeder Link Spectrum Requirements Are Difficult To Quantify Under the Current Uncertainties

Although the amount of feeder link spectrum required for a particular satellite design using simple frequency changing transponders can be determined from a simple calculation,[108] there is still considerable uncertainty over the spectrum requirements needed for viable LEO operations. These uncertainties involve L/S-band operating frequency plans, sharing and propagation conditions in the feeder link bands available.

As illustrated in Constellation's initial Comments, the amount of feeder link spectrum required is directly related to the operating frequency plan utilized at L/S-bands. For a 10-beam satellite design, Constellation's C-band feeder link spectrum requirements grew from 21 MHz, if Constellation had exclusive use of a 2.5 MHz portion of L/S-band, to 78 MHz if it shared 11.35 MHz with three other CDMA systems. This spectrum requirement would grow to 106 MHz if the Constellation satellite was designed to support service links across the entire 16.5 MHz L/S-bands. These feeder link spectrum requirements would increase when the number of L/S-band spot beams on the Constellation satellites is increased. The other LEO operators have indicated feeder link spectrum requirements between 200

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[108] See e.g. Comments of Constellation, Appendix C at Figure C-2.

MHz and 500 MHz.[109]

Another issue involves sharing feeder link bands with geostationary satellites. Although sharing feeder link bands with geostationary satellites may be theoretically feasible, significant operational difficulties are likely to arise in fulfilling the requirements of RR 2613. For this reason, Constellation indicated that it preferred to utilize feeder link bands where no sharing with GSO systems is required. The 5.1 GHz and 6.5 GHz bands initially allocated for RDSS feeder links have this characteristic because no GSO systems currently are operational in these bands.

Constellation prefers the C-band portion of the spectrum for its feeder links because of the favorable propagation conditions in this portion of the spectrum. Moreover, the use of cross-polarization to reduce the amount of feeder link spectrum required is feasible at C-band and sharing the same feeder link spectrum by two or more CDMA systems also appears feasible at C-band with proper coordination of power levels between system operators.[110]

This is not the case at Ka-band. Depolarization due to rain will make it infeasible to use cross-polarization on feeder link transmissions. Moreover, the need to dynamically adjust transmit power levels at different gateway earth stations over large ranges to overcome the large rain attenuations that occur at Ka-band is likely to make it impractical for CDMA systems to share the same feeder link spectrum.

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[109] See e.g., Comments of LQP at 83-84, Comments of Ellipsat at 25.

[110] See Comments of Constellation at Appendix C.

In summary, Constellation believes that at least 200 MHz of feeder link spectrum in each direction of transmission should be identified for LEO feeder links in the C-band portion of the spectrum. Such bands should be selected from those fixed-satellite allocations that are not currently being used by geostationary satellites (or allocated for LEO MSS feeder links in the reverse direction of transmission) in order to avoid operational difficulties resulting from the application of RR 2613.

B. Feeder Link Bands Between 3 And 15 GHz Must Be Identified Promptly By The Commission

The attractiveness of using the 5.1 GHz and 6.5 GHz bands for feeder links is that they are already allocated for RDSS feeder links. Moreover, with the recent announcement by the Federal Aviation Administration ("FAA") that they are now longer planning to implement the Microwave Landing System[111], most if not all of the 5000-5250 MHz band can now be made available for LEO feeder links. Thus, consideration should continue to be given to the use of the RDSS feeder link bands for LEO MSS feederlink bands as well.

There are a number of other bands below 15 GHz that can be considered for LEO feeder links. For example, LQP submitted extensive information in its comments identifying candidate feeder link bands and analyzing the feasibility of using them for feeder links. LEO feeder link issues are also being considered in

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[111] See Washington Post at B1, June 3, 1994; "FAA Halts Development of Microwave Landing System, Cancels Contracts," FAA News Release, FAA 17-94, June 2, 1994.

ITU-R Task Group 4/5 and are on the agenda of the 1995 WRC. Constellation will be participating in all of these activities in order to resolve the LEO feeder link issue.

C. Until Suitable Feeder Link Bands Below 15 GHz Are Assigned To The LEO Satellite Systems That Requested C-Band Feeder Links, The Commission Must Afford Equal Access To Ka-Band To All LEO Applicants

Constellation took the position in its Comments that use of the Ka-band for its feeder links will have a severe adverse impact on its operations.[112] In particular, Constellation's system architecture contemplates multiple gateway earth stations accessing its satellites by means of a simple earth coverage satellite antenna beam. Such an architecture is not feasible at Ka-band because the excess attenuation at these frequencies due to rain. This requires excessive transmit powers if earth coverage satellite antennas are used to provide multiple gateway access. If no feeder link bands below 15 GHz are available, then Constellation will, of course, have to modify its system design (at significant cost and loss of operational flexibility) in order to operate in Ka-band.

Constellation's concern in this proceeding is the lack of clear direction on how all of the pending LEO applicants will be accommodated at Ka-band if no feeder link bands below 15 GHz are available. During the NRM, TRW and Motorola devised a plan under which their systems would operate under exclusive

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[112] See Comments of Constellation at 57-59 and Appendix C.

frequency assignments in that portion of the Ka-band which is unshared with terrestrial services.[113] The NRM Report did not address the issue of how the Ka-band would be used if all five LEO applicants were required to operate at Ka-band. In the event that feeder link bands below 15 GHz are not available, then Constellation would request access to these portions of Ka-band as well.

Unfortunately, Constellation does not see how this proceeding can be resolved and construction permits issued until the feeder link issue is resolved. If the Commission can not make feeder link bands below 15 GHz available, it must make provisions for sufficient feeder link spectrum for each applicant at Ka-band.[114] The Commission must clearly lay out what will happen if alternative feeder link bands below 15 GHz do not become available for Constellation, LQP, and Ellipsat. It is essential to avoid a cut-off proceeding in the Ka-band where 1.6/2.4 GHz MSS applicants would have to compete for their feeder link frequency assignments with other Ka-band satellite and terrestrial applicants.

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[113] There are two 500 MHz portions of Ka-band that are allocated exclusively to satellite services, 19.7-20.2 GHz for downlinks and 29.5-30.0 GHz for uplinks. The other 2 GHz of Ka-band satellite spectrum, i.e. 17.7-19.7 GHz for downlinks and 27.5-29.5 GHz for uplinks, is shared with terrestrial services.

[114] The Commission should also allow LEO applicants seeking feeder link spectrum below 15 GHz the option of waiting until after the 1995 WRC before committing themselves to a final satellite design.

IX. If An Administrative Selection Mechanism Is Needed To Chose Among Mutually Exclusive Applications, Then Selection By Lottery Is The Preferred Method

As discussed in Section III above, absent a settlement among the other LEO applicants, Constellation believes that the Commission can not deny Constellation's application without a hearing or without invoking an alternative administrative selection mechanism because of the mutual exclusivity between Constellation's application and those of the other LEO applicants. In brief, Constellation believes that a careful review of the initial comments in response to the Notice support Constellation's view that comparative hearings and auctions are unacceptable, and that lotteries are the least objectionable means for the administrative selection of applicants to receive licenses.

X. Conclusion

As the Commission recognizes in its Notice, this proceeding has the potential for establishing the regulatory basis for the introduction of a broadbased offering of new mobile satellite services on a global basis. The authorization of the proposed new LEO satellite systems in the 1.6/2.4 GHz bands would not only provide a new range of advanced, low cost satellite services to the American consumer, but would also allow the establishment of a truly competitive MSS industry in this country with satellite facility-based competition. Moreover, by restricting access to the 1.6/2.4 GHz bands to LEO systems, the Commission can insure that this technology will be applied on a global basis and provide United

States companies with a leadership position in establishing the global organizations that will be necessary to finance and operate the multiple LEO MSS systems contemplated by the current applications before the Commission. The Commission's proposed frequency assignment plan could form the basis for an agreement among the applicants to eliminate mutual exclusivity and avoid alternative administrative selection procedures, provided that certain clarifications and modifications are made. In this regard Constellation applauds the Commission for its efforts to resolve this proceeding. However, it needs to be reiterated that this proceeding cannot be resolved until the LEO applicants agree on a band sharing plan and acceptable feeder links are identified for each of the applicants,

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CERTIFICATE OF SERVICE

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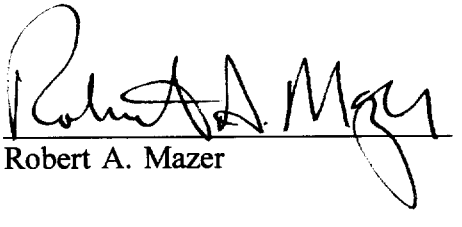

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